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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,234	08/31/2005	Charles M Ward-Close	4827-5	2518

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EXAMINER	
KESSLER, CHRISTOPHER S	
ART UNIT	PAPER NUMBER
1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/529,234	WARD-CLOSE ET AL.	
	Examiner	Art Unit	
	CHRISTOPHER KESSLER	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 January 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *31-35, 37-39, 41-54, and 56-62* is/are pending in the application.

4a) Of the above claim(s) *32, 34-35, 44, and 46-50* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *31,33,37-39,41-43,45,51-54 and 56-62* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Responsive to the amendment filed 28 January 2010, claim 31 is amended, claim 55 is cancelled, and claim 62 is added. Claims 31, 33, 37-39, 41-43, 45 51-54, and 56-62 are currently under examination.

Status of Previous Rejections

2. Responsive to the amendment filed 28 January 2010, new grounds of rejection are presented.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 31, 33, 37-39, 42-43, 45 and 51-54, 56, and 58-62 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,589,311 issued to Han et al. (hereinafter "Han"), in view of Toru H. Okabe and Donald R. Sadoway, "Metallothermic reduction as an electronically mediated reaction," J. Mater. Res., Vol. 13, No. 12, Dec 1998 (hereinafter "Okabe").

Regarding claim 31, Han teaches the invention substantially as claimed. Han teaches a method of making a high-melting powder material (see Abstract, col. 3, claim

2 or Example 1, for example). Han teaches that the method includes a purification of metal particles (see col. 6), thus meeting the limitation of a method for purifying. Han teaches that the powders contain impurities, such as oxygen and low melting point metals, which are removed (see col. 6). Han teaches that the particles are heated, melted and resolidified (see cols. 5-6). Han teaches that the heat source is a thermal plasma (see cols. 4-5), meeting the limitation of a gas flame. Han teaches that the powder particles do not contact other substances during the treatment (see col. 5), thus meeting the limitation wherein the particles are out of contact with any surfaces. Han teaches that the particles are introduced into the heat source using an electromagnetic feeder, and by being entrained in a carrier gas, and that the process yields spherical particles (see col. 5, col. 6 and figures 1 and 2). Thus, Han inherently meets the limitation wherein the particles are out of contact with each other due to the particles being entrained in a carrier gas and the lack of any coalescence in the finished product. Applicant is further directed to MPEP 2112.01. Han teaches that the apparatus comprises a vent 107 and a separate powder collecting means 108 (see figure 1), thus inherently meeting the limitation of removing the vaporized impurities from the vicinity of the particles. In the alternative, Han teaches that the vaporized impurities are removed from the vicinity of the particles inherently due to the GD-MS analysis of the powder, which shows that the impurities are dramatically reduced from the powder after the treatment (see Example 1 and Table 2). Applicant is further directed to MPEP 2112.01. Han teaches that the purified particles are cooled and collected in solid form (see cols. 5-6, Example 1, or Figure 1).

Han does not teach that the tantalum particles are manufactured by an electrochemical reduction process. Han does not specify what method is used to synthesize the raw material powder used in the purification process. However, the use of electrochemical reduction to form powders is known in the art, and would have been obvious to one of ordinary skill in the art.

For example, Okabe teaches a metallothermic reduction of tantalum powder (see Title, Introduction). Okabe teaches that the metallothermic reduction of the tantalum is an electrochemical process that is controlled by the current used (see III. Experimental Design, IV. Results, and VI. Conclusions). Okabe teaches that the rate of the reaction as well as the powder morphology and process chemistry can be controlled by controlling the electronic conduction during the reaction (see V. Discussion).

It would have been obvious to one of ordinary skill in the art at time of invention to have practiced the method of Han, and to have used as the raw powder material the tantalum powder of Okabe, because Okabe teaches that the rate of the reaction as well as the powder morphology and process chemistry can be controlled by controlling the electronic conduction during the reaction (see V. Discussion).

Regarding claim 33, Han teaches that the particles are in the form of a powder (see cols. 5-6).

Regarding claim 37, Han teaches that the apparatus comprises a heat source (see col. 5), a collection means for collecting particles 108 and separate collection means for collecting the impurities 107 (see Fig. 1).

Regarding claim 38, Han teaches that the particles free fall through the heat source (see Fig. 1).

Regarding claim 39, Han teaches that the distance from the heat source is sufficient to resolidify the particles (see cols. 5-6 and Fig. 1).

Regarding claim 42, Han teaches that the temperature of the heat source is above the melting point, but below the boiling point (see cols. 5-6).

Regarding claim 43, Han teaches wherein the metal is Tantalum metal, and that the tantalum also comprises titanium (see Example 1 and Table 2). Thus, the limitation wherein M_1 comprises titanium is met. Applicant is further directed to MPEP 2111.03.

Regarding claim 45, Han teaches that calcium impurities are removed from the powder by the process (see Example 1 and Tables 1 and 2).

Regarding claim 51, Han teaches that the particles are within the size range as claimed (see Fig. 2).

Regarding claim 52, Han teaches that the particles are in the form of finely sized granules (see Example 1 and Fig. 2).

Regarding claim 53, Han teaches that the powder particles do not contact other substances during the treatment (see col. 5), thus meeting the limitation wherein the particles are out of contact with any surfaces.

Regarding claim 54, Han teaches that the apparatus comprises an induction coil 103, as is well known in the art of plasma generation (see Fig. 1). Han teaches that the particles pass through the nozzle, which is located in the induction coil (see col. 5 and Fig. 1), and that the particles do not contact other substances during the treatment (see

col. 5), thus meeting the limitation wherein the particles are out of contact with any surfaces.

Regarding claim 56, Han teaches that the method is conducted in a controlled atmosphere (see col. 6).

Regarding claim 58, Han teaches that the apparatus comprises a heat source (see col. 5), a collection means for collecting particles 108 and separate collection means for collecting the impurities 107 (see Fig. 1).

Regarding claim 59, Han teaches that the method is used to create powder containing reduced impurities and spherical particles (see Example 1 and Fig. 2).

Regarding claim 60, Han teaches that the contaminating impurities are less than 50 ppm (see Table 2).

Regarding claim 61, Han teaches that the contaminating impurities are less than 10% of their concentration before purification (see Table 2).

Regarding claim 62, Han teaches that the particles are individually purified and spheroidized, and that the particles are used for PM processes (see cols. 5-6, Example 1 and Figs. 1 and 2).

5. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Han in view of Okabe as applied to claim 31 above, and further in view of U.S. Patent 3,690,635 issued to Harker et al. (hereinafter “Harker”).

Han in view of Okabe do not teach wherein the step of removing the vaporized impurities comprises condensing the vaporized contaminating impurities on cold

collector plates positioned adjacent the heating source and disposing of the impurities. However, this step is known in the art furnace construction, and would have been obvious to one of ordinary skill in the art.

For example, Harker teaches a condensate collection means. Harker teaches that during processes which involve melting of metals, evaporated portions of the melted material can condense on surfaces, and the condensed matter then builds up and peels off, dropping flakes back into the work (see col. 1). Harker teaches that the peeling flakes may cause numerous problems, such as contamination of the work (see col. 1). Harker teaches that a collection means (a collector plate) is used to collect the vaporized portions (see cols. 1-2 and col. 3). Harker teaches that the collector is desirable for processes in which vaporization occurs, such as those involving purification of metals (see col. 5). Harker teaches that the collector is positioned above the molten material, or that it may be positioned differently depending on the furnace configuration (see col. 3). Thus, the location of the collector would have been an obvious matter of choice to one of ordinary skill in the art since Harker teaches that the collector may be arranged to suit the furnace configuration (see col. 3). Applicant is further directed to MPEP 2144.04 C. The limitation of "cold" is met inherently due to the fact that the condensate forms on the plate, as well as to the fact that the plate is outside of the heating zone, where the vapors rise or flow. Applicant is further directed to MPEP 2112.01.

It would have been obvious to one of ordinary skill in the art at time of invention to have practiced the method of Han, and to have used as the raw powder material the

tantalum powder of Okabe, because Okabe teaches that the rate of the reaction as well as the powder morphology and process chemistry can be controlled by controlling the electronic conduction during the reaction (see V. Discussion), and further to have used the cold collector plate of Harker in order to prevent contamination of the melted material due to peeling of the condensed material, as taught by Harker (see col. 1 or col. 3).

6. Claim 57 is rejected under 35 U.S.C. 103(a) as being unpatentable over Han in view of Okabe as applied to claim 31 above, and further in view of "Production of Refractory Metal Powders" *ASM Handbook* vol. 7 (1998), pp. 188-201 (hereinafter "ASM Handbook").

Han in view of Okabe do not teach wherein a further purification step comprises water or acid washing of the powder. However, this step is known in the art of powder metallurgy, and would have been obvious to one of ordinary skill in the art.

For example, ASM Handbook teaches methods commonly employed in the art of powder metallurgy (see p. 188). ASM Handbook teaches common methods for the synthesis of tantalum powders (see p. 198 and Fig. 19). ASM Handbook teaches that the reduction of tantalum fluoride (the same process of Okabe) is used to produce tantalum metal powder (see p. 198 and Fig. 19). ASM Handbook teaches that the tantalum powder is removed from the salt cake by washing in water and acid (see p. 198 and Fig. 19).

It would have been obvious to one of ordinary skill in the art at time of invention to have practiced the method of Han, and to have used as the raw powder material the tantalum powder of Okabe, because Okabe teaches that the rate of the reaction as well as the powder morphology and process chemistry can be controlled by controlling the electronic conduction during the reaction (see V. Discussion), and to have washed the powder after the reduction method of Okabe, as taught by ASM Handbook (see p. 198 and Fig. 19), in order to separate the metal powder from the salt cake, as taught by ASM Handbook (see p. 198 and Fig. 19).

Response to Arguments

7. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. 3,343,944 teaches a method of purifying electrochemically reduced beryllium particles by vaporizing impurities. 4,390,368 is exemplary of the prior art methods of plasma atomization of agglomerated powders to yield spheroidized and purified particles.

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER KESSLER whose telephone number is (571)272-6510. The examiner can normally be reached on Mon-Fri, 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ Roy King/
Supervisory Patent Examiner, Art Unit 1793

csk